Nutrition Support in Surgical Oncology: sharing evidence based practices

At a Nestle Nutrition Institute satellite symposium held at the Digestive Disorder Federation 2012 congress (DDF) chaired by Dr William Allum, leading experts discussed the important role that nutrition plays in the management of patients undergoing upper GI surgery. Dr Christophe Mariette explained the importance of nutrition in surgery treatment plans and assessed the evidence for pre-operative immunonutrition in decreasing the risk of post-operative infection, reducing the length of hospital stay and costs. Dr Clare Shaw discussed nutritional aspects of Enhanced Recovery Programmes involving pre-operative immunonutrition and carbohydrate loading.

Incorporating nutrition into treatment plans for upper GI surgery

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Patients with upper GI cancer are at high risk of malnutrition

Up to 80% of patients with upper GI cancer have already experienced some degree of weight loss by the time of diagnosis.1 This weight loss is due to local and systemic effects of the tumour, but also to the effects of anti-cancer therapies and to fear, anxiety and depression.2

<table>
<thead>
<tr>
<th>Tumour site</th>
<th>Prevalence of malnutrition (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancreas</td>
<td>80 – 85</td>
</tr>
<tr>
<td>Stomach</td>
<td>65 – 85</td>
</tr>
<tr>
<td>Head and neck</td>
<td>65 – 75</td>
</tr>
<tr>
<td>Oesophagus</td>
<td>60 – 80</td>
</tr>
<tr>
<td>Lung</td>
<td>45 – 60</td>
</tr>
<tr>
<td>Colon / rectum</td>
<td>30 – 60</td>
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</tbody>
</table>

Malnutrition increases the risk of post-operative complications

Following surgery, all patients are more vulnerable to infection3 but malnourished patients have a particular risk of experiencing post-operative complications and an increased length of stay in hospital.2,4,5 Malnourished patients are also at risk for decreased responsiveness to therapy and increased toxicity.6,7 Upper GI patients in particular undergo more neoadjuvant chemo- and radiotherapy that increase the risk of malnutrition before surgery. A 10% loss of body weight is a predictor of post-operative complications, particularly wound healing infections and general infections such as pneumonia and sepsis.4,5

“Malnutrition is a risk factor for postoperative complications”

Nutrition is an important part of hospital patient care

Infection control procedures are in place in all hospitals to limit the development and spread of infection, but standard artificial nutrition is also an important part of infection control through improvement of the host response to infection. Following GI surgery, enteral nutrition has been found to be preferential to parenteral nutrition in terms of reduced infectious complications.6 This systematic review also found that there was a significantly reduced risk of overall complications, intra-abdominal abscesses, anastomotic leaks and a reduced length of hospital stay. However, there was a significantly increased risk of vomiting with enteral nutrition.8

ESPEN (European Society for Clinical Nutrition and Metabolism) have published guidelines on the most appropriate tube system to use for enteral nutrition based on the level of risk of aspiration and the expected duration of nutritional support.2 Patients with upper GI cancer are expected to require long term nutritional support, therefore percutaneous endoscopic gastrostomy (PEG) with or without a jejunal extension tube (JET) is recommended where there is a low risk of aspiration. The limitations of this technique are that many of these patients have obstructive tumours and there is also a high risk of causing colon or liver injury and of metastatic inoculation. The main problem is the risk of vascular injury particularly to the gastroepiploic artery limiting further surgical intervention.10-12

In our institution, we reviewed our experience of percutaneous radiological gastrostomy (PRG) on 269 patients carried out over a period of 13 years, looking specifically at the feasibility and morbidity.13

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In PRG, the tube is placed with radiographic assistance. Of the 269 patients with PRG, 139 underwent surgery but there was no significant difference in PRG success rate: surgery group, 92.8% (129/139); non-surgery group, 94.6% (123/130). The ten failures in the surgery group were due to complete obstruction (8) or interposition of another organ (2). The complication rate, at 3.4% overall, was very low and most complications occurred early on when staff were less familiar with the technique.

“Enteral feeding early in the therapeutic programme helps avoid post-operative complications.”

When surgical patients (n=78) undergoing PRG were case-matched with similar patients without PRG (n=156), there was no significant difference in surgical outcomes. Although the stomach can be injured by tube placement, there was only one case of suspected metastatic inoculation which turned out to be fibrosis. Post-operatively there was no difference between the groups regarding the type, incidence or grade of complication. Our conclusion is that this technique has a high success rate, with low associated morbidity. Patients receive better nutrition and have a similar post-operative course despite the fact that more complications would be expected given the level of malnutrition in upper GI cancer patients. Enteral feeding early in the therapeutic programme appears to help in avoiding some post-operative complications.

In recent years, standard enteral nutrition has been enhanced with nutrients whose specific purpose is to up-regulate the host immune response, control the inflammatory response and improve nitrogen balance and protein synthesis following injury. The immunonutrients used are glutamine, arginine, poly-unsaturated fatty acids (omega 3), nucleotides, taurine, vitamins A, E and C, beta carotene and trace elements.

Immunonutrition and the evidence

The use of immunonutrition in the surgical setting has been well-studied with over 28 RCTs. However, there is a great degree of heterogeneity in terms of nutritional status and the type of control used and some studies were quite small. Despite this, the effect of immunonutrition has generally been found to be beneficial. Stronger evidence emerges from a number of meta-analyses that combine the data from the individual trials. So far, eight meta-analyses have assessed the evidence relating to the use of immunonutrition in the surgical setting.14-21 The overall conclusion is that, in surgical patients, a lower rate of infectious complications and shorter hospital stay were associated with pre-operative immunonutrition, relative to standard enteral nutrition.

Looking specifically at post-surgical infections, Waltzberg et al (2006) found a 57% reduction in the incidence of abdominal abscesses, and a 39% reduction in the overall incidence of wound infection. Anastomotic leaks were also reduced by 48%.15 Reduced complications naturally also have an effect on reducing the costs of managing complications.22

So in summary, malnourished patients undergoing upper GI surgery are at a higher risk of developing post-operative complications, particularly infections. The enteral route is preferred for nutritional support even before surgery. There is Grade A evidence that immunonutrition can decrease the post-operative infection rate, length of hospital stay and healthcare costs.
Specialised nutrition as a part of Enhanced Recovery Programmes

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Quality improvement through Enhanced Recovery Programmes

Enhanced Recovery Programmes (ER Programmes) are quality improvement tools that have been introduced as part of the National Health Service innovation and improvement initiative. The Royal Marsden Multidisciplinary ER Programme was set up in 2010 and contains the following elements:

1. Pre-operative assessment, planning and preparation
2. Reduction of the physical stress of the operation
3. A structured approach to immediate post-operative and peri-operative management
4. Early mobilisation

Nutrition in the pre-operative phase

There is good evidence to support the use of artificial nutrition in patients preparing for major surgery. The ESPEN guidelines on surgery recommend that nutritional support be given to patients with severe nutritional risk 10 to 14 days prior to surgery, even if there is a possibility that surgery may be delayed. The majority of these patients will be receiving pre-operative chemotherapy and can receive a nutritional assessment to optimise nutritional status at the initial visit to the surgeon. The same guidelines recommend that enteral nutrition should preferably contain immune-modulating substrates, such as arginine, omega-3 fatty acids and nucleotides, regardless of the nutritional status of the patient.

One of the studies which first provided some evidence of the potential value of immunonutrition was carried out in 1999 by Senkal et al. Patients about to undergo surgery were randomised to receive five days of pre-operative nutritional support with either standard formulae or immunonutrition; post-operative support commenced 12 hours after surgery. Three days following surgery, the number of patients who developed infectious complications was significantly lower in the immunonutrition group than in the group receiving standard formulae. However, this benefit was not maintained during the post-operative recovery and surgeons were often reluctant to implement these findings.

However, many surgeons require stronger evidence than this, which was provided in a study by Gianotti et al. This study randomised over 300 patients with moderate weight loss (<10%) to three treatment groups: pre-operative immunonutrition, pre- and post-operative immunonutrition or no artificial nutrition. Compared to the group that received no artificial nutritional support, the two groups taking immunonutrition both experienced significantly lower infectious complication rates (31/102, 14/102 (p=0.006), 16/101 (p=0.02) respectively).

The most conclusive evidence comes from a meta-analysis of randomised controlled trials carried out over the period 1985 to 2009 which included the results of 21 RCTs involving a total of 2730 patients. None of the patients in these studies had received neo-adjuvant chemotherapy or radiotherapy. The results were clear: immunonutrition had a positive effect on overall post-operative complication rates, on post-operative infections in patients undergoing major GI surgery, and on length of hospital stay. Eighteen out of the 21 studies included in this meta-analysis used immunonutrition containing arginine, omega-3 fatty acids and Ribonucleic acid (RNA).

“Our patients at Royal Marsden receive five days of pre-operative immunonutrition in the form of Oral Impact”

At the Royal Marsden, this evidence base for peri-operative nutrition informs the ER Programmes: patients awaiting surgery receive five days of immunonutrition with the aim of reducing their risk of post-operative infections. The nutrition package they receive contains Oral Impact in their...
chosen flavour, instructions for use, a shaker to help prepare the impact and a check-sheet to record their use of the supplement.

Auditing the ER Programme for upper GI surgery

Results are now available for 27 patients who have been managed according to the ER Programme and these have been compared with the outcomes for [35] patients who were managed before the introduction of the programme. Patients were undergoing a variety of procedures including oesophago-gastrectomy, total gastrectomy, or partial gastrectomy. Following the introduction of the ER Programme, the median total length of stay dropped by three days, from 18 to 15.

“The Royal Marsden ER Programme acknowledges the evidence base, and provides patients with a 50g glucose loading on the morning of surgery”

Length of stay pre and post introduction of ER

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Mean Age</th>
<th>N</th>
<th>Median total length of stay (including readmission)</th>
<th>Median length of CCU stay (including readmission)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Oesophagogastrctomy</td>
<td>64.3</td>
<td>62.8</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>Total gastrectomy</td>
<td>60.9</td>
<td>71.0</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Subtotal gastrectomy</td>
<td>69.6</td>
<td>69.9</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>Overall</td>
<td>65.7</td>
<td>68.0</td>
<td>35</td>
<td>27</td>
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In conclusion: evidence from clinical trials supports the use of nutritional interventions in the peri-operative setting, that can improve patient outcome.

A structured approach with good patient involvement, commencing in the pre-operative phase, ensures that these interventions are used to best effect.

References


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Nestlé Nutrition Institute

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